



# A Review On Pharmacognostic Outlook On The Medicinal Plant Of *Spathodea Campanulate*

<sup>1</sup>Mr. Saurabh Walunj\*, <sup>2</sup>Miss. Nikita Khamgal, <sup>3</sup>Miss. Dhole A.S., <sup>4</sup>Dr. Patil R.N.

<sup>1</sup>Research Scholar, <sup>2</sup> Research Scholar, <sup>3</sup>Asst. Prof., <sup>4</sup>Principle.

<sup>1234</sup>Delonix Society's Baramati College of Pharmacy, Barhanpur  
Tal-Baramati, Dist-Pune, Maharashtra, India.

**ABSTRACT:** *Spathodeacampanulata* (*S.campanulata*), also called the fountain tree, African tulip tree, or flame-of-the-forest, is a member of the Bignoniaceae family. Plants have been used as a major source of medication for a number of human illnesses since ancient times. Numerous plants are mentioned in ancient medical systems; *Spathodea campanulata* P. Beauvais is one of the most important medicinal plants. The flowers, leaves, stem, bark, and roots of *Spathodea campanulata* have all been shown to have cytotoxic, anti-inflammatory, analgesic, anti-diabetic, and anticonvulsant qualities. Phytochemical screening finds several secondary metabolites, such as sterols, alkaloids, tannins, flavonoids, and glycosides. We collected and reviewed relevant information and literature on *Spathodea campanulata* from online resources like Web of Science, Academic Journals, Google Scholar, Science Direct, and PubMed. The literature makes it abundantly evident that *Spathodea campanulata* possesses a wide range of pharmacological characteristics, which can be ascribed to the presence of several phytochemicals. The goal of the current review is to provide thorough information regarding the African tulip tree's therapeutic uses. A variety of articles were employed to achieve this goal.

**KEYWORDS:** *Spathodea campanulata* P. Beauvais, Anti-convulsant, Cytotoxicity, Anti-microbial, Anti-cataract.

## I. INTRODUCTION [1,2,3,4,5,6]

Medicinal plants play an important role in our natural wealth. They serve as an important therapeutic agent as well as valuable raw material for manufacturing numerous traditional medicines and also acts as the lead for modern medicines. The history of medicinal plants uses for treating disease and ailments is probably dated back to human civilization. World Health Organization (WHO) estimated that about three-quarters of the world's population currently uses herbs or other forms of traditional medicines to treat illness. Even in the USA, the use of plants and phytomedicines has increased dramatically. The large diversity of medicinal plant species is a huge source of potentially active phytochemicals with novel structures. Approximately 119 pure chemical substances isolated from higher plants are used in medicine throughout the world. *Spathodea campanulata* P. Beauvais is one of the medicinally important perennial plants commonly used as folkloric medicine in Nigeria. Worldwide, about 119 pure chemical compounds that have been separated from higher plants are utilized in medicine. One of the significant perennial plants utilized in Nigerian folk medicine is *Spathodea campanulata* P. Beauvais. *Spathodea campanulata* is a native of Africa and a member of the Bignoniaceae family. In tropical and subtropical regions, particularly South America, it is frequently utilized in gardening. The leaves are used to treat renal disorders, urethral inflammations, and as an antidote to animal poisons, while the blossoms are used as an anti-inflammatory and diuretic. The stem bark, leaves, flowers, and fruits of *Spathodea campanulata* were used in a number of phytochemical investigations. While polyphenols, tannins, saponins, and glycosides are found in fruits, spathodol, caffeic acid, other phenolic acids, and flavonoids are found in leaves. According to reports, the plant leaves have analgesic, anti-inflammatory, antiplasmodial, and antilarvicidal properties. There has been evidence of hypoglycemic, anticomplementary, antimalarial, and anti-HIV properties in the stem bark decoction of *Spathodea campanulata*.

**a. Flowers****b. Fruits****c. Leaves****d. Trunks****figure 1: different parts of s.campanulata:**

*Bignonia tulipifera* Thonn, *Spathodea tulipifera* (Thonn.), *Spathodea nilotica* Seem.

**Table 1: Vernacular, English, Local names of S.campanulata:**

<p><b>Vernacular:</b> Nandi flame, African tulip tree.</p> <p><b>English:</b> fountain tree Tulipier du Gabon, arbre-flamme (Fr). Tulipeira-do-Gabão (Po Kifabakazi (Sw).</p>	<p><b>Local Name:</b> Kannada: Neerukayimara; Hindi (rugtoora); Malay (panchut-panchut); Tamil (patadi); Trade name (Nandi flame, flame of the forest).</p>
---	---

## II. SCIENTIFIC CLASSIFICATION [7]

The botanical name of this plant is *Spathodea campanulata* P. beauv, however it is popularly known as the African tulip tree or Flame tree. Within the flowering plant family Bignoniaceae, which consists of over 800 species spread across 112 genera, it is a single species of the monotypic genus *Spathodea*.

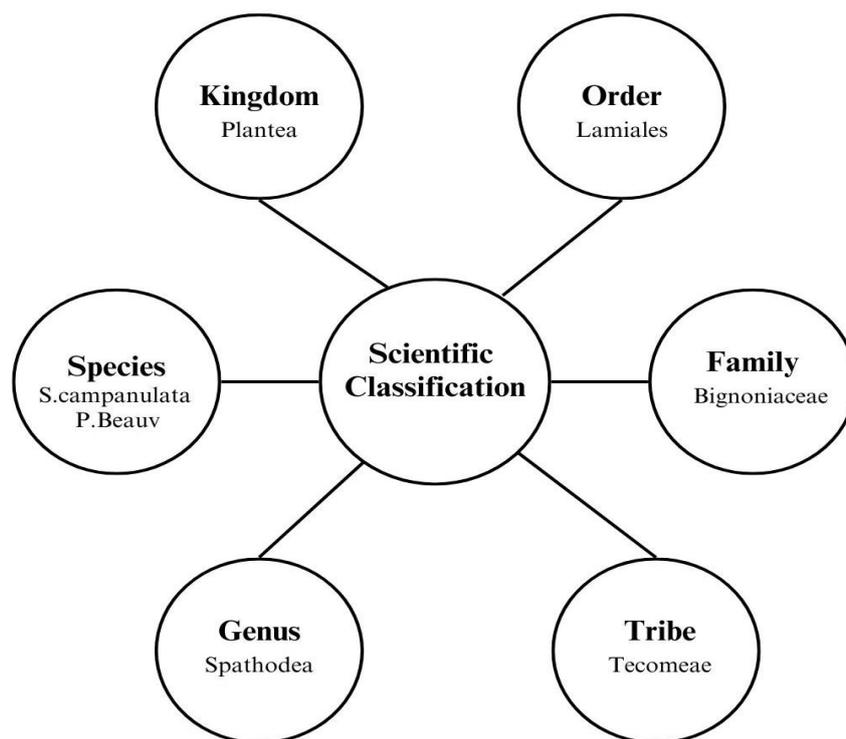


figure 2:scientific classification:

## III. GEOGRAPHICAL DISTRIBUTION [8]

Africa is the native home of the *Spathodea campanulata* P. Beauvais tree. It is grown as an ornamental plant throughout tropical Africa, such as in Madagascar, Zimbabwe, and Cape Verde. Outside of Africa, it is extensively cultivated in tropical and subtropical areas. In India, this plant is also frequently found as an ornamental.

## IV. PROPAGATION OF AFRICAN TULIP [9]

One kilogram contains approximately 125,000 seeds, which are recalcitrant and have a short viability. Cuttings can also be used for propagation, with larger diameter cuttings (up to 10 cm) yielding the best results. Saddle and side grafting are occasionally used to multiply desirable ornamental forms, such as yellow flowers, with side grafting having higher success rates (75% vs. 25%); however, saddle-grafted plants have better growth. Furthermore, root suckers can be used for propagation.

## V. CHEMICAL CONSTITUENTS [10,11,12,13,14,15,16,17]

Table 2: Parts of the plant and their respective chemical Constituents:

Part of plant	Isolated photochemicals
Stem	Sterols and Triterpenes Triacontanol, octacosanol, and N-alcohols (35%).
Root peels	P-hydroxybenzoic acid and methyl p-hydroxybenzoate
Bark	Spathoside, nalkanes, linear aliphatic alcohols, oleanolic acid, pomolic acid, p-hydroxybenzoic acid, sitosterol and its esters, beta-sitosterol-3-O-beta-D-glucopyranoside, and phenylethanol ester. 13-olide, oleanolic acid, 3 $\beta$ -acetoxy-12-hydroxyoleanan-28, 13 $\beta$ -acetoxyoleanolic acid, and siaresinolic acid.
Leaves	Verminoside, 6'-O-trans-caffeoyl-loganic acid, Ajugol, Catalpol, and Spathosides A, B, and C . Flavonoids, phenolic acid, caffeic acid and spathodol.
Fruits	Glucosides, saponins, tannins, and polyphenols.

Flower	1,1-diethoxy-3-methyl-butane, N-hexadecanoic acid, 1,2-benzenedicarboxylic acid diisooctyl ester, and oleic acid. Phytol, $\alpha$ -methyl Cinnamaldehyde, $\beta$ -sitosterol-3-acetate, naringenin, catechin-3-O- $\alpha$ -rhamnopyranoside and 5, 6, 4' trihydroxy flavonol-7-O- $\alpha$ -rhamnopyranoside, Anthocyanins.
--------	---

## VI. MEDICINAL USES [18]

In African traditional medicine, the stem, bark, and leaf are used to treat peptic ulcers and dyspepsia; the leaf, root, bark, and fruit are used to treat fractures and arthritis; the stem bark is used to treat stomachaches and stomachaches; and the root bark seed is used to treat stomach ulcers.

*S. campanulata* has a wide range of medicinal applications in both its native and introduced areas. Extracts of the bark, leaves, and flowers are used to treat a variety of conditions, including malaria, HIV, diabetes mellitus edema, dysentery, constipation, gastrointestinal disorders, ulcers, skin diseases, wounds, fever, urethral inflammation, liver complaints, and liver poison antidote. It may also be useful as a malaria prophylactic and in controlling *Aedes* mosquitoes. Pulverized bark is used for skin conditions, a decoction for dysentery, renal, and gastrointestinal issues, and an infusion of leaves is used for urethral inflammation. The bark has laxative and antiseptic properties, and the seeds, flowers, and roots are used as medicine. The bark is chewed and sprayed over swollen cheeks, and it can be boiled in water used to treat body rashes in newborns.

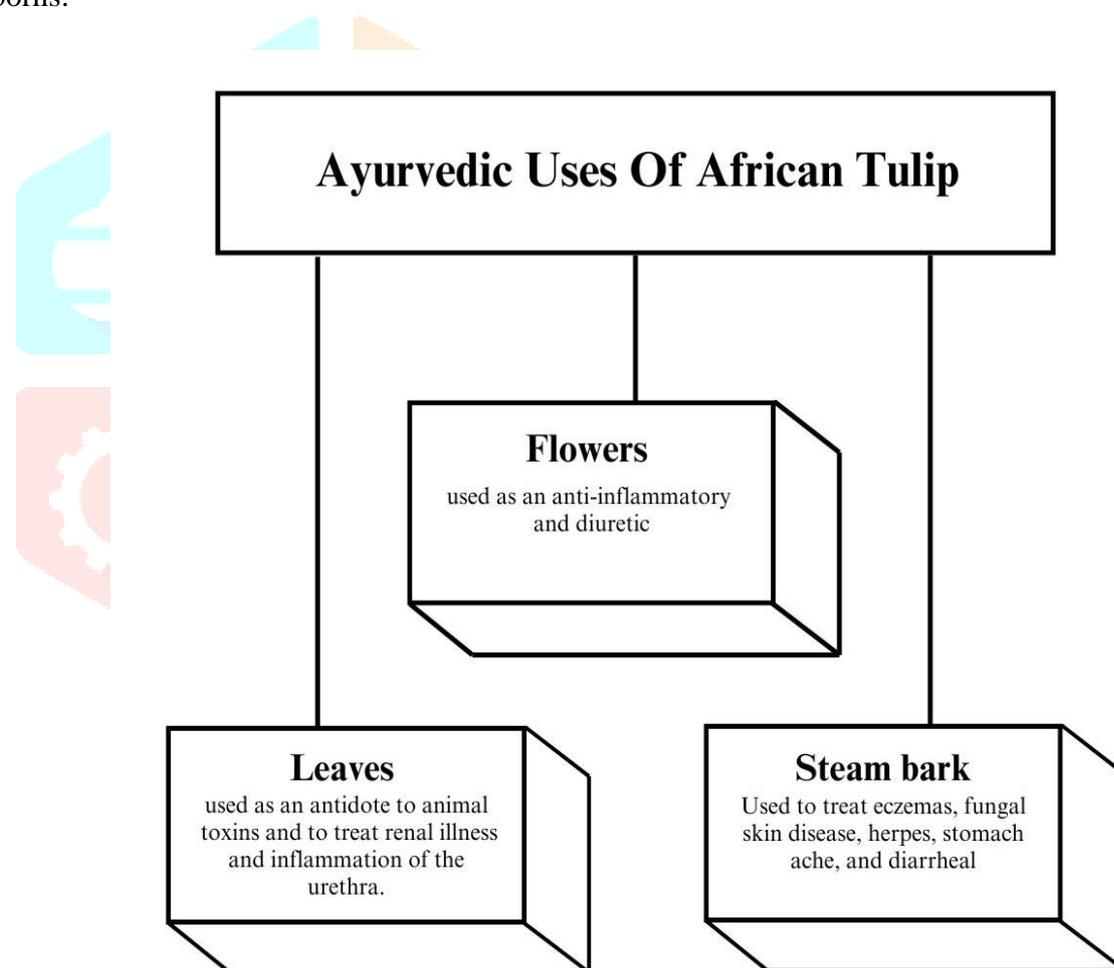


figure 3: ayurvedic uses of *s. campanulata*:

### i. Anti-solar activity [19,20]:

1. Methanolic extract of *S. campanulata* flowers with antisolar properties. The results demonstrated that the extract could absorb UV light, demonstrating its capacity to produce UV light. The presence of flavonoids may be the cause of this ability.
2. The UV absorption capacity of *Spathodea campanulata* flowers as an anti-solar agent was assessed by Patil VV et al. Through maceration, the flower petals were extracted using distilled water: methanol (2:5). A twin beam UV-visible spectrophotometer was used to capture the extract's UV absorption spectra in the 200–400 nm region. The extract displayed good absorbance at a range of 240–325 nm and

a noticeable absorbance at 200–240 nm. Between 310 and 340, a moderate absorption was observed. The extract can be employed as an anti-solar agent because the results demonstrated its capacity to absorb UV radiation and demonstrate its UV protective ability.

#### ii. Antimalarial and schizontocidal activity [21]:

Researchers have looked into how *S. campanulata* extracts affect Plasmodium berghei-infected mice. The plant's schizontocidal activity in blood was assessed for both acute and chronic infections. Additionally, the plant's repository activity was examined. The plant's leaves showed antiplasmodial action in an alcoholic preparation. The early infections were better treated by the plant extract than the more established ones. The aqueous-alcoholic decoction of *S. campanulata* leaves is used to cure malaria, according to scientific evidence presented in this paper.

#### iii. Anti-oxidant activity [22,23]:

1. It has been demonstrated that the flavonoids, triterpenoids, diterpenoids, and derivatives of caffeic acid from *S. campanulata* give the extracts their anti-inflammatory and antioxidant qualities.
2. Heim et al. investigated the lipid peroxidation process to determine the antioxidant activity of the bark and floral extract of *Spathodea campanulata* P. beauv. When Fe<sup>3+</sup>-ascorbic acid caused lipid peroxidation in liver microsomes, ethanol extracts of bark and flowers demonstrated antioxidant activity. Bark extracts outperformed flower extracts by a factor of five. It has been demonstrated that iron complex formation is linked to the antioxidant activity of flower extract that previously complexed with increasing concentrations of Fe<sup>3+</sup> (20-100 µm), which led to the antioxidant activity loss. However, spectral analysis showed that the prior Fe<sup>3+</sup> complexation did not inhibit the antioxidant activity of bark extract. These findings imply that the antioxidant mechanisms of the bark and flower extracts of *Spathodea campanulata* P. beauv differ.

#### iv. Anti-diabetic activity [24,25]:

1. Tanayen et al. looked into the potential antidiabetic effects of *Spathodea campanulata* P. beauv. methanolic stem bark extract. A variation of the oral glucose tolerance test was used to assess the methanolic extract's antidiabetic potential after it underwent serial solvent fractionation with hexane, ethyl acetate, and chloroform. The activity result showed that, although there was no statistically significant decrease ( $p < 0.05$ ), the different fractions decreased glucose-induced hyperglycemia. The control group experienced a reduction of 44.7% in hyperglycemia as a percentage. A dose-dependent reduction of 44.4% at 50 mg/kg, 48.2% at 100 mg/kg, and 49% at 200 mg/kg was seen in the hexane fraction. At 50 mg/kg, 46.5%, and 200 mg/kg, the ethyl acetate fraction decreased hyperglycemia by 48.5%, 46.5%, and 42.3%, respectively. Hyperglycemia was decreased by 67.3% at 50 mg/kg, 53.4% at 100 mg/kg, and 74.7% at 200 mg/kg by the remaining aqueous fraction. A dose of 500 mg/kg of metformin, a common euglycemic medication, decreased hyperglycemia by 48%. The antihyperglycemic properties of all three fractions studied are present, with the hexane fraction showing a more pronounced dose-dependent effect.
2. In mice, the bark decoction of *S. campanulata* stem (SCD) has demonstrated hypoglycemic effects. It was split into several fractions using column chromatography, and the hypoglycemic, anti-complement, and anti-HIV properties of each fraction were assessed. In several biological models, the most polar component had by far the most noticeable impact.

#### v. Anti-cataract activity [26]:

Using rat lenses, Adio et al. assessed the anti-cataract activity of fresh flower bud exudates of *Spathodea campanulata* P. beauv against cataract genesis. By measuring the amounts of antioxidant factors such total protein, glutathione, malondialdehyde, and superoxide dismutase, as well as the catalase activity in the lens homogenates, cataractogenesis was assessed. When cataractous lenses were compared to normal control lenses, exudates showed a significant decrease in glutathione and total protein levels, a decrease in superoxide dismutase and Catalase activities, and an increase in malondialdehyde content. The anti-cataract action of *Spathodea campanulata* P. beauv flower bud exudates was dose-related.

#### vi. Anti-diarrheal activity [27]:

The stem bark of *S. campanulata* possesses anti-diarrheal properties in both alcoholic and aqueous preparations.

**vii. Anti-convulsant activity [28]:**

A glycoside that was extracted from the leaf of *Spathodea campanulata* P. beauv was tested for anticonvulsant properties by Emmanuel et al. The active component was isolated from the ethanol leaf extract using bioactivity-guided fractionation. Pentylenetetrazole and electrically produced seizures were used to test the isolated compound's anticonvulsant properties. Anti-convulsion activities were examined, including the impact on rotarod performance and phenobarbitone-induced sleep duration. Moreover, nuclear magnetic resonance and mass spectrometry were used to perform the acute toxicity tests and structural analysis of the isolated molecule. The results showed that the new active chemical isolated from *Spathodea campanulata* significantly ( $p < 0.05$ ) eliminated maximal electroshock seizures and pentylenetetrazole-induced seizures. The isolated compound's oral and intraperitoneal LD50s were calculated by acute toxicity experiments to be 323.59 and 158 mg/kg, respectively. The isolated glycoside's structure was determined to be urs-12-en-27 $\alpha$ , 30 di-oic acid. (1 $\rightarrow$ 2)  $\alpha$ -L-arabinopyranoside 3-O- $\alpha$ -L-rhamnopyranosyl.

**viii. Analgesic and anti-inflammatory activity [29]:**

Emmanuel and Peter used carrageenan-induced acute inflammation in rats as well as cold, heat, and chemically generated pain models to examine the analgesic and anti-inflammatory properties of *Spathodea campanulata* P. beauv. The leaves of *Spathodea campanulata* were defatted with petroleum ether (40–60 °C) and extracted using 70% ethanol during cold maceration. The findings demonstrated that the extract (250–1000 mg/kg) decreased acetic acid-induced writhing and significantly ( $P < 0.05$ ) and dose-dependently extended the pain reaction times in hot-plate and tail flick pain models. Significant anti-inflammatory activity was demonstrated by the ethanolic extract against acute inflammation brought on by carrageenan.

**ix. Hepatoprotective activity [30]:**

In a rat model of hepatotoxicity generated by carbon tetrachloride, Charles et al. assessed the hepatoprotective and curative potential of an aqueous extract of the stem bark of *Spathodea Campanulata* P. beauv. Significant hepato-protective benefits against carbon tetrachloride-induced liver injury in experimental rats were found in both the preventative and curative investigations. These outcomes were associated with both the antioxidant protecting capacity and the liver histology of the treated and control groups. The extract's hepatoprotective action is associated with its antioxidant properties and CYP 450 enzyme inhibition, which may have disrupted CCl<sub>4</sub> bioactivation and shielded the hepatocytes. Thus, the current investigation demonstrated that *Spathodea campanulata*'s aqueous stem bark extract considerably prevents rats' liver damage from being reversed by CCl<sub>4</sub>.

**x. Cytotoxic activity [31]:**

The cytotoxic potential of the methanolic extract of *Spathodea campanulata* P. beauv was examined by Victor et al. The air-dried material was soaked in methanol for 48 hours at room temperature to create a methanolic extract, which was then tested for cytotoxic activity against sensitive leukemia CCRF-CRM cell lines using the Resazurin Reduction assay. The methanolic extract's IC<sub>50</sub> value was less than 80  $\mu$ g/ml.

**xi. Molluscicidal activity [32]:**

The molluscicidal activity of hexane and ethyl acetate extract of *Spathodea campanulata* P. beauv's flowers and stem bark against *Biomphalaria glabrata* adults and egg masses was examined by Mendes et al.

**xii. Anti-fungal activity [33]:**

Iridoid glycoside (ajugol) and two phenolic derivatives (p-hydroxybenzoic acid and methyl p-hydroxybenzoate) were separated by Driana et al. from the ethanolic extract of the root peels of *Spathodea campanulata* P. beauv (Bignoniaceae). The fungus *Cladosporium herbarum* was tested against these isolated chemicals. Ajugol, an iridoid glycoside, showed no antifungal action against *Cladosporium herbarum*, while methyl p-hydroxybenzoate and p-hydroxybenzoic acid, phenolic components, did.

**xiii. Healing of burns [34]:**

*S. campanulata* bark methanolic extract has the ability to effectively cure burns.

**xiv. Anti-bacterial activity [35]:**

Among the recognized substances (n-alkanes, linear aliphatic alcohols, sitosterol and its esters,  $\beta$ -sitosterol-3-O- $\beta$ -D-glucopyranoside, oleanolic acid, pomolic acid, p-hydroxybenzoic acid, and phenylethanol esters) that were isolated from the stem bark of *Spathodeacampanulata* was a novel cerebroside called spathoside. The separated chemicals' structures were determined using spectroscopic

analysis. Examined was the isolated compounds' antibacterial efficacy against a variety of microbes. They dramatically slowed the growth of certain bacteria, both gram-positive and gram-negative.

## VII. REFERENCE

1. Tripathi PA, Singh AD. Natural resources from plants in the treatment of cancer: an update. *Asian J Pharm Clin Res.* 2017;10(7):13-22.
2. Farnsworth NR, Akerele O, Bingel AS, Soejarto DD, Guo Z. Medicinal plants in therapy. *Bulletin of the world health organization.* 1985;63(6):965.
3. Joly AB. *Introduction to taxonomic vegetation.* 7th ed. Sao Paulo: Ed. National; 1985.
4. Mensah AY, Houghton PJ, Dickson RA, Fleischer TC, Heinrich M, Bremner P. In vitro evaluation of effects of two Ghanaian plants relevant to wound healing. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives.* 2006 Nov;20(11):941-4.
5. Ngouela S, Tsamo E, Sondengam BL. Extractives from Bignoniaceae: constituents of the stem bark of *Spathodea campanulata*. *Planta medica.* 1988 Oct;54(05):476.
6. Niyonzima G, Laekernan G, Witvrouw M, Van Poel B, Pieters L. Hypoglycemic, anti-complement and anti-HIV activities of *Spathodea campanulata* stem bark. *Phytomedicine* 1999; 6:45-9.
7. Spangler RE, Olmstead RG. Phylogenetic analysis of bignoniaceae based on the cp DNA gene sequences *rbcL* and *ndhF*. *Ann Mo Bot Gard* 1999;86:33-46.
8. Bosch CH. *Spathodea campanulata* P. Beauv. [Internet] Record from PROTA4U. Oyen, L. P. A. and Lemmens, R. H. M. J. (Editors); 2002.
9. [http://database.prota.org/PROTAhtm/Spathodea%20campanulata\\_En.Hy](http://database.prota.org/PROTAhtm/Spathodea%20campanulata_En.Hy) J Chemical constituents.
10. Gormann R, Schreiber L, Kolodziej H. Cuticular wax profiles of leaves of some traditionally used African Bignoniaceae. *Z Naturforsch C* 2004;59:631-5.
11. Mbosso EJ, Ngouela S, Nguedia JC, Penlap V, Rohmer M, Tsamo E. Spathoside, a cerebroside and other antibacterial constituents of the stem bark of *Spathodea campanulata*. *Nat Prod Res* 2008;59:296-304.
12. Silvere N, Etienne T, Beibam L, Sondengam. Extractives from bignoniaceae: constituents of the stem bark of *Spathodea campanulata*. *Planta Med* 1988;54:476.
13. Gouda YG. Iridoids from *Spathodea campanulata* P. Beauvais leaves. *Nat Prod Commun* 2009;4:753-6.
14. El-Hela A. Phenolics from *Spathodea campanulata* Beauv leaves. 2001;27:152-62.
15. Amusan OO, Adesogan K, Makinde JM. Antimalarial active principles of *Spathodea Campanulata* stem bark. *Phyther Res* 1996;10:692-3.
16. Kumaresan M, Palanisamy PN, Kumar PE. Chemical investigation of the flower of *Spathodea campanulata* by GC-MS. *J Nat Prod Plant Resour* 2011;1:14-7.
17. Naglaa GS, Hanaa HE, Soheir M. Bioactivity and composition of the flowers of *Spathodea campanulata* p. Beauv *World J Pharm Res* 2014;3:213-30.
18. Taman HerbaVokasma. Blog tentangjenis-jenisherba 2005 October 5
19. VinayakV.Patil., et al. "Study of metanolic extract of flower of *Spathodeacampanulata* as anti-solar." *International Journal Of Green Pharmacy* 2009.
20. Patil VV, Patil SB, Kondawar MS, Naikwade NS, Magdum CS. Study of methanolic extract of the flower of *Spathodea campanulata* L. as an anti-solar. *Int J Green Pharm* 2008;3:248-9.
21. Makinde., et al. "The anti-malarial activities of *Spathodeacampanulata* stem bark extract on *Plasmodium bergheberghei* in mice". *Plant Med.* 1988;54(2):122-5

22. Ngouela s., et al. "Extractives from Bignoniaceae: Constituents of stem bark of *Spathodeacampanulata*." *Planta Med.* 1988; 54(5):476.
23. Heim SC, Guarnier FA, Ferreira DT, Braz-Filho R, Cecchini R, Cecchini AL. Antioxidant activity of *Spathodea campanulata* (Bignoniaceae) extracts. *Rev Bras Plant Med* 2012;14:287-92.
24. Tanayen JK. Phytochemical and antidiabetic evaluation of the methanolic stem bark extract of *Spathodea campanulata* (P. Beauv.) bignoniaceae. *Pharmacogn J* 2016;8:243-8.
25. Niyonzima G., et al. "Hypoglycemic and anticomplement and anti-HIV activities of *Spathodeacampanulata* stem bark Phytomedicine." 1999; 6(1):45-49.
26. Adio GI, Faluyi JO, Osoniyi O. "Evaluation of the effect of *Spathodeacampanulata* flower bud exudates on Cataractogenesis in rat lenses." *Afr J Tradit Complement Altern Med* 2014;11:83-91.
27. Rajesh S., et al. "Antidiarrheal activity of stem bark extracts of *Spathodeacampanulata* in rodents." *Pharmacologyonline.* 2009; 1:396-405.
28. Emmanuel EI, Peter AA, Theophine CO, Edwin OO. Anticonvulsant effects of a glycoside isolated from the leaf of *Spathodea campanulata* P. Beauv. *J Med Plants Res* 2010; 20:1895-900.
29. Emmanuel EI, Peter AA. *Spathodea Campanulata*: an experimental evaluation of the analgesic and anti-inflammatory properties of a traditional remedy. *Asian J Med Sci* 2009;1:35-8.
30. Charles A, Phyllis ED, Emmanuel A. Aqueous stem bark extract of *Spathodea campanulata* (P. Beauv) modulates carbon tetrachloride induced hepatic damage in rats. *AJPT* 2013;8:39-50.
31. Victor K, Cedric T, Flora TM, Veronique PB, Thomas E. Cytotoxicity of methanolic extracts of 10 Cameroonian medicinal plants towards multi-factorial drug-resistant cancer cell lines. *BMC Complementary Altern Med* 2016;16:1-18
32. Brindha P, Nagarajan A, Saralla RP, R Narendran R, Sridharan K. A study on chemical and botanical standards of a traditional drug source *Spathodea campanulata* beauv. *Int J Pharm Pharm Sci* 2012;4:157-60
33. Driana P, Jurandir PP, Dalva TF, Noemia KI, Raimundo B. Iridoid glucoside and antifungal phenolic compounds from *Spathodea campanulata* roots. *Semina: Ciências Agrárias, Londrina* 2007;28:251-6.
34. Sy GY, Ngewou PW., et al. "Healing activity of methanolic extract of the barks of *Spathodeacampanulata* Beauv (Bignoniaceae) in rat experimental burn model." *Dakar Med.* 2005; 50(2):77-81.
35. Jigna P., et al. "Antibacterial activity of aqueous and alcoholic extracts of 34 medicinal plants against some *Staphylococcus* Species." *Turk J Biol.* 2008; 32:63-71.